

STUDY ON THE LEIOGNATHID FISHES OF TAIWAN

SHIH-CHIEH SHEN and WEN-WEN LIN

Department of Zoology, National Taiwan University
Taipei, Taiwan, Republic of China

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Shih-Chieh Shen and Wen-Wen Lin (1985) Study on the leiognathid fishes of Taiwan. *Bull. Inst. Zool., Academia Sinica* 24(1): 125-138. In the present revision of leiognathid fishes found in the surrounding waters of Taiwan and its adjacent islands, twelve species belonging to three genera are recognized. They are *Gazza minuta*, *G. achlamys*, *Secutor ruconius*, *S. insidiator*, *Leiognathus equulus*, *L. splendens*, *L. brevirostris*, *L. nuchalis*, *L. bindus*, *L. leuciscus*, *L. berbis*, *L. lineolatus*. Among them, three species, *Gazza achlamys*, *Secutor insidiator* and *Leiognathus nuchalis* are new records for Taiwan. A key to genera and species, descriptions, figures and remarks (if any) of each species are presented.

Ponyfishes of the Leiognathidae are typically small, laterally-compressed and can be easily separated from members of allied families by scaleless head, no detached spines before anal fin, three anal spines, strongly protractile mouth and nuchal spine on nape. Taxonomically, the Leiognathidae has had a long and complex history in Taiwan. Twelve species have been listed in the "Synopsis of the Vertebrates of Taiwan" (Chen, 1969). The result of the descriptive list is extremely confusing and three species among them are found without specimens. Therefore, a detailed review of the Leiognathidae is necessary.

MATERIALS AND METHODS

The materials used for this study were collected from various fish harbors located in the coast of Taiwan and its adjacent islands. All the specimens are deposited in the Museum of the Department of Zoology, National Taiwan University (NTUM).

The length used in recording the size of the specimens is standard length (SL), which is the horizontal distance from the front tip of the snout to the base of the caudal fin.

Height of head is measured as the vertical distance from the nape across the posterior end of operculum to the thorax. Spine and soft ray counts of the dorsal and anal fins are differentiated by Roman numerals for spines and Arabic numerals for soft rays. In recording gill-raker counts, the number on the upper limb is given first, followed by that for the lower limb; the raker at the angle is included in the count of the lower limb. All the meristic and morphometric measurements are shown in Table 1. Morphometric measurements in each species are shown in proportion to standard length or head length.

Key to Genera and Species of the Leiognathidae of Taiwan

1. Distinct canine teeth present; protracted mouth directed forward (*Gazza*).....2
Canine teeth absent, teeth minute.....3
2. Depth of body marrow, 2.15-2.52 in standard length.....*Gazza minuta*
Depth of body broad, 1.76-1.90 in standard length.....*Gazza achlamys*
3. Mouth oblique, when protracted directs upward (*Secutor*).....4
Mouth horizontal, when protracted directs forward or downward (*Leiognathus*)..5

TABLE 1
Body proportions and meristic counts of the leiognathid fishes (family Leiognathidae) of Taiwan

Species	In standard length				In head length		
	Head length	Depth	Height of head	Longest pectoral ray	Width of body	Snout length	Horizontal eye diameter
1. <i>Gazza minuta</i>	2.95-3.27	2.15-2.52	2.37-2.61	5.30-5.79	1.68-1.99	3.17-3.84	2.74-3.23
2. <i>G. achlamys</i>	2.94-3.09	1.76-1.85	1.91-2.10	4.87-4.92	1.78-1.84	4.10-4.23	2.66-2.88
3. <i>Secutor ruconius</i>	3.05-3.38	1.71-1.99	1.87-2.14	3.88-4.40	1.87-2.28	2.96-3.65	2.44-2.95
4. <i>S. insidiator</i>	3.58-4.19	2.12-2.36	2.29-2.58	4.77-5.32	1.82-2.11	3.20-4.04	2.76-3.15
5. <i>Leiognathus equulus</i>	2.78-3.23	1.68-1.89	1.85-2.06	4.21-4.74	1.75-2.15	3.06-4.39	3.01-3.61
6. <i>L. splendens</i>	3.01-3.68	2.01-2.27	2.24-2.41	4.15-4.68	1.51-1.93	4.02-5.16	2.45-3.01
7. <i>L. brevis</i>	3.31-3.34	2.16-2.32	2.43-2.57	4.73-4.96	1.76-1.82	3.69-3.95	3.01-3.37
8. <i>L. nuchalis</i>	3.41	2.05	2.31	1.86	4.40	3.40	3.12
9. <i>L. bindus</i>	3.23-3.86	1.81-2.08	2.07-2.29	5.02-5.89	1.78-2.19	3.43-4.07	2.42-3.07
10. <i>L. leuciscus</i>	3.46-3.84	2.16-2.72	2.62-3.04	5.34-6.22	1.61-2.13	2.99-3.84	2.94-3.43
11. <i>L. berbis</i>	3.29-3.98	2.18-2.39	2.57-2.86	4.47-5.22	1.42-1.98	3.21-4.02	2.66-3.32
12. <i>L. lineolatus</i>	3.37-3.79	2.42-2.88	2.70-3.13	5.46-6.16	1.88-2.28	3.26-3.84	2.74-3.38

Species	In head length		In depth		Number of pectoral rays	Gill raker	Number of specimens
	Interorbital	Least depth of caudal peduncle	Second dorsal spine	Second anal spine			
1. <i>Gazza minuta</i>	2.97-3.33	4.70-5.41	2.42-3.01	2.79-3.21	17-18	4-6+14-17(19-23)	24
2. <i>G. achlamys</i>	2.93-3.22	4.16-4.49	3.24-3.39	2.80-3.08	16-17	5-6+15 (20-21)	2
3. <i>Secutor ruconius</i>	3.14-3.75	3.89-4.58	3.63-4.73	4.71-5.74	16-18	3 +16-18(19-21)	12
4. <i>S. insidiator</i>	3.10-3.79	4.51-5.25	3.35-4.11	4.73-5.80	17-19	5-7+20-23(26-30)	25
5. <i>Leiognathus equulus</i>	2.75-3.35	3.93-4.92	1.91-2.46	2.73-3.09	18-21	5-7+16-18(21-24)	14
6. <i>L. splendens</i>	2.52-3.15	3.60-4.51	2.01-2.68	2.48-3.36	17-18	5-6+21-22(26-28)	24
7. <i>L. brevis</i>	3.01-3.32	4.10-4.54	2.41-2.77	3.02-3.45	18-19	5-6+17 (22-23)	3
8. <i>L. nuchalis</i>	3.16	3.85	2.95	3.46	17	4+15 (19)	1
9. <i>L. bindus</i>	2.99-3.48	3.98-4.73	2.89-3.59	3.71-4.61	16-18	4-5+17-18(21-23)	33
10. <i>L. leuciscus</i>	2.72-3.30	3.97-4.74	0.83-1.68	1.18-2.36	17-19	4-6+12 (16-18)	13
11. <i>L. berbis</i>	2.62-3.12	3.72-4.45	1.93-2.83	2.66-3.50	17-18	5-6+11-14(16-20)	11
12. <i>L. lineolatus</i>	3.06-3.47	4.85-5.88	2.52-3.17	3.41-4.06	17-18	4-5+15-17(20-22)	21

4. Depth 1.71-1.99 in standard length; back with 9-11 continuous vertical dark bands *Secutor ruconius*
Depth 2.12-2.36 in standard length; back with interrupted crowded vertical bands and dots *Secutor insidiator*
5. Lateral line dermal tube conspicuous and continued to base of caudal 6
Lateral line dermal tube ending near or before end of dorsal, the posterior lateral line tube getting obsolete 9
6. No dark or brown blotch on nape; dorsal profile more convex than ventral 7
A dark or brown blotch on nape; dorsal and ventral profiles more or less equal .. 8
7. Mandible strongly concave; no black blotch on spinous dorsal; snout longer or equal to eye *Leiognathus equulus*
Mandible slightly concave; jet black blotch on spinous dorsal; snout blunt, shorter than eye... *Leiognathus splendens*
8. Mandible strongly concave; no distinct blotch on spinous dorsal; back with some irregular lines descending below lateral line *Leiognathus brevirostris*
Mandible slightly concave; a large black blotch between the second and sixth dorsal spines *Leiognathus nuchalis*
9. Abdomen trenchant, more convex than dorsal profile; spinous dorsal with an orange blotch, inferiorly edged with black *Leiognathus bindus*
Dorsal and ventral profiles more or less equal 10
10. Second dorsal spine prolonged, longer than half height of body; second anal spine also prolonged; back with crowded irregular dark marks *Leiognathus leuciscus*
Second dorsal spine not longer than half height of body 11
11. Body depth 2.18-2.39 in standard length; upper profile of head rises to back with a little concavity; back with a few irregular spots under the dorsal and zig-zag lines arranged serially along the lateral line *Leiognathus berbis*
Body more elongate, depth 2.42-2.88 in standard length; upper profile of head rises to back without a concavity; back with irregular dark marks *Leiognathus lineolatus*

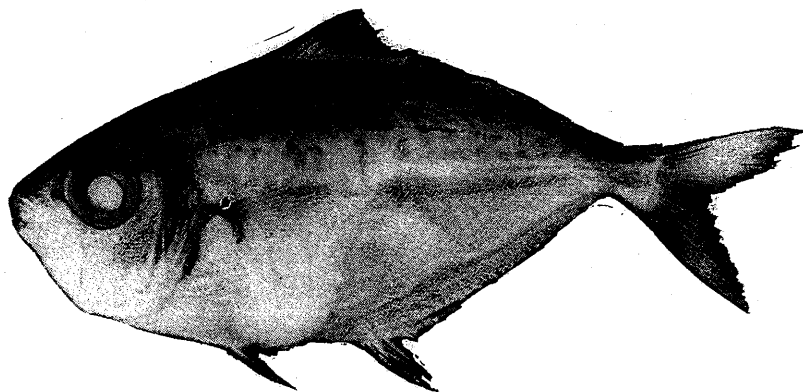
Gazza minuta (Bloch, 1797)

Fig. 1, Table 1.

Scomber minutus Bloch, 1797: 110, fig. 2.*Gazza minuta*, Weber and de Beaufort, 1931: 339-341.

Materials: 24 specimens: NTUM 05759(8), 83.1-99.0 mm SL, Oct. 31, 1982, Tungkang; NTUM 05761(7), 111.0-128.0 mm SL, July 29, 1983, Tachi; NTUM 05763(9), 88.8-101.8 mm SL, Nov. 1, 1983, Kaohsiung (Chungchou).

Descriptions: D. VIII, 16; A. III, 14; P. 17-18; gill rakers 19-23 (4-6+14-17); body oblong, dorsal and ventral profiles more or less equal, the rostro-occipital profile almost

Fig. 1. *Gazza minuta* (Bloch), NTUM 05763, 97.9 mm SL.

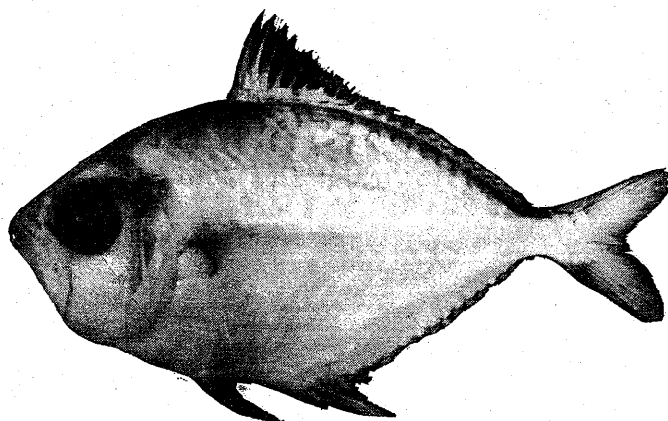


Fig. 2. *Gazza achlamys* Jordan and Starks, NTUM 05764, 79.7 mm SL.

straight; a pair of post-nasal spines above eye; a single row of sharp teeth in upper jaw, with a curved canine tooth on anterior tip of each side; in lower jaw, a row of large curved, pointed canine teeth on each side, with a notch between them to receive the upper canines; gape of mouth oblique, mouth when protracted directs forward; snout pointed, slightly shorter than eye diameter, mandible almost straight, ascending with an angle of about 45°; lower margin of preoperculum finely serrated; lateral line continued to base of caudal; dorsal and anal spines weak, ventral with an axillary scale-like process.

Color in formalin, snout dotted grey, spinous dorsal dotted grey, back with faint irregular blotch or wavy lines.

***Gazza achlamys* Jordan and Starks, 1917**

Fig. 2, Table 1.

Gazza achlamys Jordan and Starks, 1917: 446.

Materials: 2 specimens: NTUM 05764, 79.7 mm SL, March 26, 1980, Tungkang; NTUM 05765, 96.4 mm SL, Oct. 31, 1982, Tungkang.

Descriptions: D. VIII, 16; A. III, 14; P. 16-17; gill rakers 20-21 (5-6+15); body oval, dorsal and ventral profiles more or less equal, head profile almost straight; a pair of post-nasal spines above eye; a single series of sharp teeth in upper jaw, with a curved canine on anterior tip of each side; in lower jaw, a series of small pointed canine teeth on each side, with a notch between them to re-

ceive the upper canines; gape of mouth oblique, mouth when protracted directs forward; snout shorter than eye diameter, mandible almost straight, ascending with an angle of about 60°; lower margin of preoperculum coarsely and strongly serrated; lateral line conspicuous, continued to caudal base; dorsal and anal spines compressed, second anal spine much stronger than second dorsal spine, ventral with an axillary scale.

Color in formalin, snout tip and spinous dorsal dotted grey, edge of the soft dorsal grey, back greyish with dark irregular circles or marks, sometimes absent after preservation.

Remarks: *G. achlamys* is similar to *G. minuta* but it can be easily distinguished from the latter by having higher body depth, smaller canine teeth and stronger second anal spine.

***Secutor ruconius* (Hamilton and Buchanan, 1822)**

Fig. 3, Table 1.

Chanda ruconius Hamilton-Buchanan, 1822: 106.

Secutor ruconius, Fowler, 1927: 273.

Materials: 12 specimens: NTUM 02383, 37.2 mm SL, 1960, Penghu; NTUM 05746, 62.6 mm SL, June 7, 1978, Tachi; NTUM 05747, 56.6 mm SL, Dec. 3, 1978, Kou-tzu-liao; NTUM 05748(3), 47.4-61.7 mm SL, March 16, 1979, Kaohsiung (Sinta harbor); NTUM 05749, 53.1 mm SL, Oct. 26, 1981, Nan-fang-ao; NTUM 05750(5), 36.0-47.6 mm SL, Oct. 31, 1982, Tungkang.

Descriptions: D. VIII, 16; A. III, 14; P.

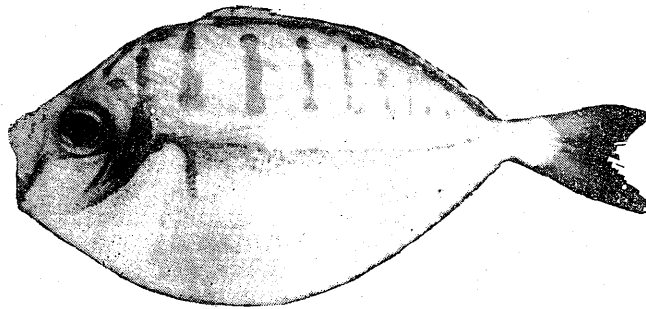


Fig. 3. *Secutor ruconius* (Hamilton and Buchanan), NTUM 05748, 61.7 mm SL.

16-18; gill rakers 19-21 (3+16-18); body nearly oval, compressed, ventral profile more convex than dorsal profile, a concavity on head in occipital region; a single prominent spine above eye behind nostrils; teeth minute, in a villiform band, mouth small, oblique, when protracted directs upward; snout pointed, somewhat shorter than eye, mandible slightly concave, at right angle to mouth opening; lower margin of preoperculum finely serrated; lateral line ending before the end of dorsal; dorsal and anal spines weak, the second dorsal and anal spine longest, ventral shorter, with an axillary scale-like process.

Color in formalin, a black line from front edge of orbit to chin, spinous dorsal with a black tip, back with 9-11 continuous vertical dark bands.

Secutors insidiator (Bloch, 1787)

Fig. 4, Table 1.

Zeus insidiator Bloch, 1787: 41, figs. 2-3.

Secutor insidiator, Fowler, 1928: 154.

Materials: 25 specimens: NTUM 05751(5), 78.9-94.8 mm SL, Oct. 31, 1982, Tungkan;

NTUM 05752(2), 73.3 and 77.4 mm SL, Feb. 5, 1983, Ko-tzu-liao; NTUM 05753(6), 76.8-82.9 mm SL, July 29, 1983, Tachi; NTUM 05754, 87.4 mm SL, Aug. 29, 1983, Penghu; NTUM 05755(9), 62.6-94.7 mm SL, Oct. 30, 1983, Tungkan; NTUM 05756(2), 75.6-79.5 mm SL, Nov. 1, 1983, Kaohsiung (Chungchou).

Descriptions: D. VIII, 16; A. III, 14; P. 17-19; gill rakers 26-30 (5-7+20-23); body elongate, compressed, ventral profile more convex than dorsal, a concavity on head in occipital region; a pair of spines above the front border of eye behind nostrils, the outer prominent and the inner minute; teeth minute, mouth small, oblique, when protracted directs upward; snout pointed, not longer than eye, mandible slightly concave, at right angle to mouth slit; lateral line ending before the end of dorsal; dorsal and anal spines weak and compressed, ventral short with an axillary scale-like process.

Color in formalin, snout margin grey, a narrow black line from front edge of orbit to chin, tip of spinous dorsal black, back with intermittent crowded vertical bands and dots.

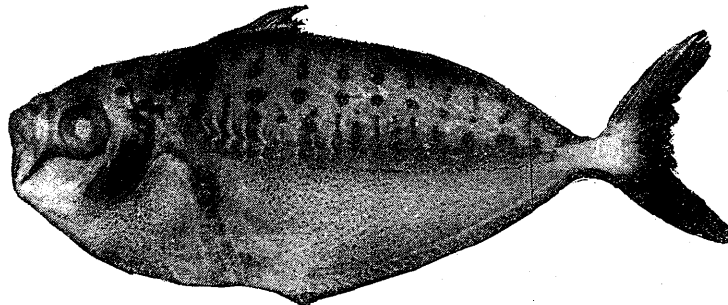


Fig. 4. *Secutor insidiator* (Bloch), NTUM 05755, 89.7 mm SL.

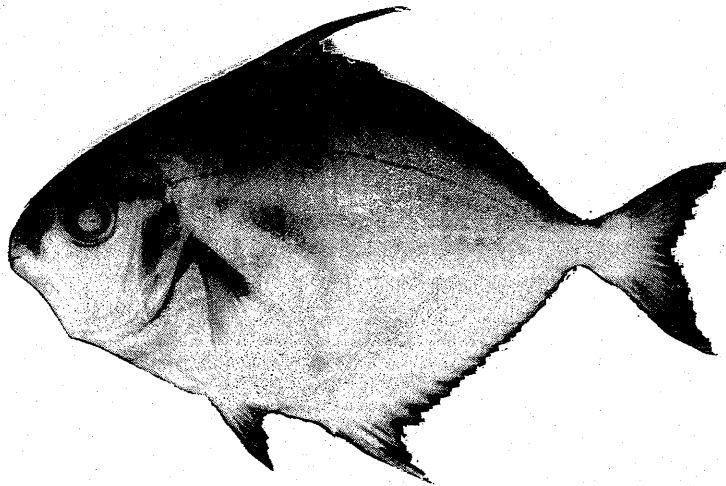


Fig. 5. *Leiognathus equulus* (Forsskal), NTUM 05706, 124.9 mm SL.

Leiognathus equulus (Forsskal, 1775)

Fig. 5, Table 1.

Scomber equula Forsskal, 1775: 75.

Leiognathus equulus, Weber and de Beaufort, 1931: 322-324.

Materials: 14 specimens: NTUM 05702, 116.5 mm SL, March 27, 1980, Tungkang; NTUM 05703(5), 60.2-76.5 mm SL, Jan. 15, 1981, Tungkang; NTUM 05704, 123.0 mm SL, Oct., 31, 1982, Tungkang; NTUM 05705, 133.2 mm SL, Nov. 14, 1982, Tungkang; NTUM 05706(2), 121.6 and 124.9 mm SL, Oct. 30, 1983, Tungkang; NTUM 05707(3), 74.1-82.6 mm SL, Nov. 1, 1983, Kaohsiung (Chungchou); NTUM 05708, 104.5 mm SL, Feb. 26, 1984, Kaohsiung (Chungchou).

Descriptions: D. VIII, 16; A. III, 14; P. 18-21; gill rakers 21-24 (5-7+16-18); dorsal profile much more convex than ventral profile, strongly elevated near commencement of dorsal, thence running in an almost straight line to caudal peduncle; a pair of small spines above the front border of eye behind the nostrils, eye diameter slightly shorter than the snout; rostro-occipital profile curved with a concavity before nostrils and the other in the occipital region; teeth minute, mouth when protracted directs downward, mandible strongly concave; lateral line

conspicuous, extending to the base of caudal; second dorsal spine somewhat elongate, about 1.91-2.46 in height of body, second anal spine about equal to head without snout, ventral fin with a prominent axillary scale-like process.

Color in formalin, snout dotted black, back greyish, tips of soft dorsal black, posterior margin of caudal lobes dusky.

Leiognathus splendens (Cuvier, 1829)

Fig. 6, Table 1.

Equula splendens Cuvier, 1829: 212; Günther, 1860: 501.

Leiognathus splendens, Weber and de Beaufort, 1931: 324-326.

Materials: 24 specimens: NTUM 05715, 93.2 mm SL, Dec. 23, 1972, Nan-fang-ao; NTUM 05719(3), 88.3-102.9 mm SL, July 14, 1978, Tachi; NTUM 05720(4), 64.1-69.1 mm SL, Oct. 31, 1982, Tungkang; NTUM 05721(6), 87.8-104.6 mm SL, July 29, 1983, Tachi; NTUM 05724(8), 46.3-88.6 mm SL, Nov. 1, 1983, Kaohsiung (Chungchou); NTUM 05725(2), 91.0 and 97.3 mm SL, Feb. 26, 1984, Tungkang.

Descriptions: D. VIII, 16; A. III, 14; P. 17-18; gill rakers 26-28 (5-6+21-22); dorsal profile more convex than ventral, nuchal

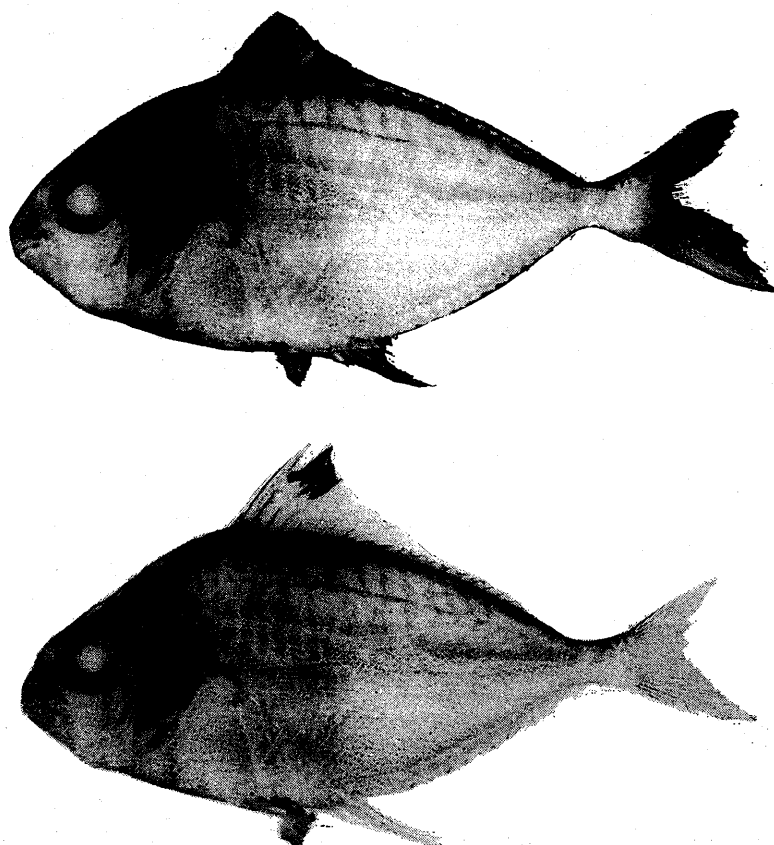


Fig. 6. *Leiognathus splendens* (Cuvier), NTUM 05724, 89.8 mm SL.

spine longer than eye; a pair of small spines above the front border of eye, border of eye behind them denticulate; snout blunt, shorter than eye diameter; minute teeth in a single series, mouth when protracted directs a little downward, mandible very slightly concave; the lower margin of preoperculum finely serrated; lateral line conspicuous, terminating at base of caudal; the second dorsal and anal spine rather strong, ventral fin with an axillary scale-like process.

Color in formalin, tip of snout dotted black, a jet black blotch between the second to sixth dorsal spines, back with faint irregular stripes descending below the lateral line; in fresh condition, the base of dorsal spines and the membrane between anal spines yellow.

Leiognathus brevirostris (Valenciennes, 1835)

Fig. 7, Table 1.

Equula brevirostris Valenciennes in Cuvier and Valenciennes, 1835: 83.

Leiognathus brevirostris, Weber and de Beaufort, 1931: 330-331.

Materials: 3 specimens: NTUM 05767(3), 78.0-84.4 mm SL, Nov. 3, 1983, Kaohsiung (Sinta harbor).

Descriptions: D. VIII, 16; A. III, 14; P. 18-19; gill rakers 22-23 (5-6+17); body oval, dorsal and ventral profiles more or less equally convex, head profile with a slight concavity; a pair of spines at the anterior-superior angle of eye behind nostrils; snout pointed, not longer than eye; teeth minute, in a single series in both jaws, mouth when protracted directs downward, mandible moderately

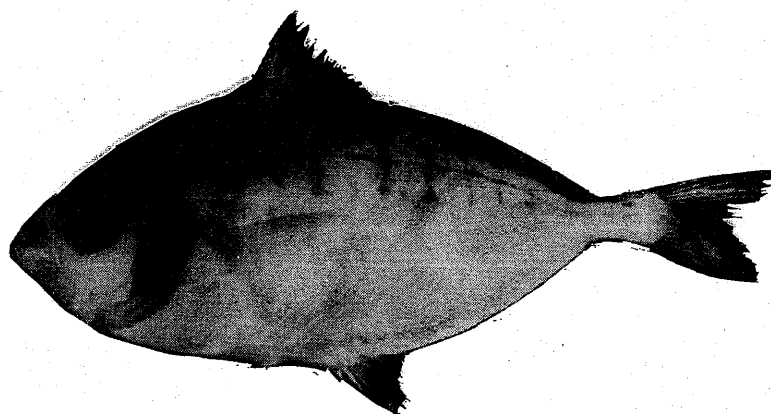


Fig. 7. *Leiognathus brevirostris* (Valenciennes, 1835), NTUM 05767, 78.0 mm SL.

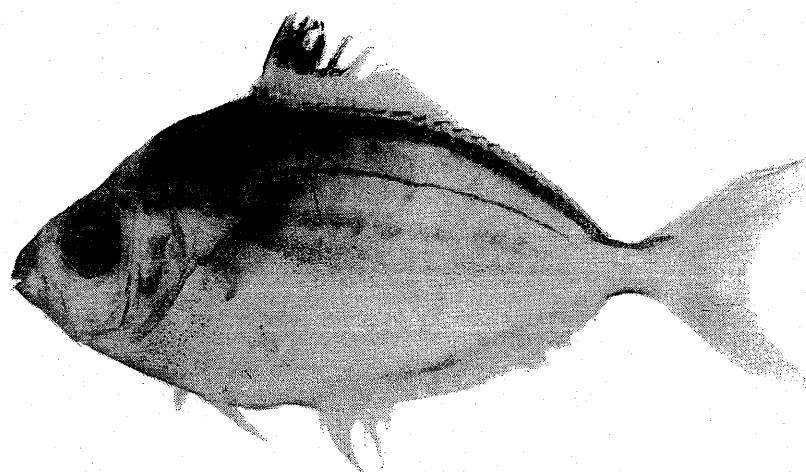
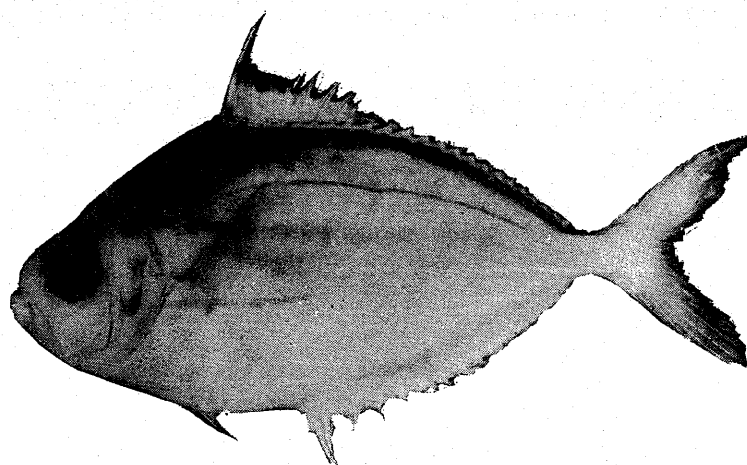


Fig. 8. *Leiognathus nuchalis* (Temminck and Schlegel), NTUM 05766, 78.8 mm SL.

concave; the lower margin of preoperculum serrated; lateral line tube conspicuous, terminating at base of caudal; dorsal and anal spines moderate and compressed, ventral fin with an axillary scale-like process.

Color in formalin, snout tip with a dotted black band, a dark transverse blotch across the nape, the upper half of spinous dorsal dotted grey, back with irregular lines descending below lateral line from behind head to end of dorsal; in fresh condition, a prominent golden yellow patch on pectoral axil and abdomen, but it fades away with time.

Leiognathus nuchalis (Temminck
and Schlegel, 1842)

Fig. 8, Table 1.

Equula nuchalis Temminck and Schlegel, 1842: 126, pl. 67, fig. 1.

Materials: 1 specimen: NTUM 05766, 78.8 mm SL, March 16, 1979, Kaohsiung (Sinta harbor).

Descriptions: D. VIII, 16; A. III, 14; P. 17; gill rakers 19 (4+15); body oval, dorsal profile a little more convex than ventral profile, a slight concavity in occipital region; a pair of spines at the antero-superior angle of eye behind nostrils; snout pointed, about equal to eye diameter; teeth villiform, mouth when protracted directs downward; mandible slightly concave, nearly straight; lower margin of preoperculum finely serrated; lateral line tube

conspicuous, continued to caudal base; second dorsal and anal spines strong ventral fin with an axillary scale-like process.

Color in formalin, snout tip dotted brown, a deep brown transverse blotch across the nape, a black blotch on the upper half of spinous dorsal between the second to sixth dorsal spine, the margin of back brownish, the lower half of lateral side yellowish; in fresh condition, a brownish yellow longitudinal band from behind head to caudal, back with a few irregular brownish yellow lines, anal fin yellowish.

Leiognathus bindus (Valenciennes, 1835)

Fig. 9, Table 1.

Equula bindus Valenciennes in Cuvier and Valenciennes, 1835: 78; Günther, 1860: 501.

Leiognathus bindus, Weber and de Beaufort, 1931: 334-335.

Materials: 33 specimens: NTUM 05735, 73.8 mm SL, Nov. 13, 1972, Tungkan; NTUM 05736, 80.0 mm SL, March 18, 1978, Tungkan; NTUM 05737, 81.4 mm SL, April 22, 1978, Tachi; NTUM 04105(4), 60.0-72.8 mm SL, March 27, 1980, Tungkan; NTUM 05738, 72.5 mm SL, Oct. 26, 1981, Nan-fang-ao; NTUM 05739, 68.7 mm SL, Oct. 26, 1981, Tachi; NTUM 05740, 71.9 mm SL, Nov. 20, 1981, Nan-fang-ao; NTUM 05741(8), 61.4-78.8 mm SL, Oct. 31, 1982, Tungkan; NTUM 05742(2), 64.5 and 80.1 mm SL, Nov. 14, 1982,

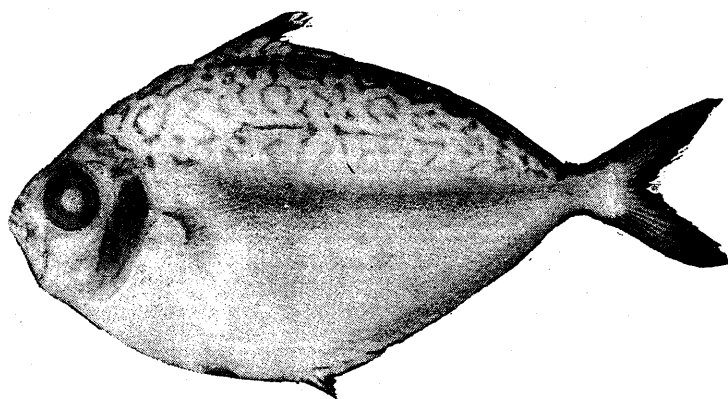


Fig. 9. *Leiognathus bindus* (Valenciennes), NTUM 05744, 84.1 mm SL.

Tungkang; NTUM 05743(5), 77.1–105.1 mm SL, July 29, 1983, Tachi; NTUM 05744(8), 43.6–87.5 mm SL, Oct. 30, 1983, Tungkang.

Descriptions: D. VIII, 16; A. III, 14; P. 16–18; gill rakers 21–23 (4–5+17–18); body oval shaped, compressed, abdomen before anal trenchant, gradually increase more convex than opposite dorsal profile with age, the occipital region showing a slight concavity; a pair of conspicuous spines above anterior border of eye behind nostrils; minute teeth in a single series, mouth when protracted directs forward; snout pointed, shorter than eye, mandible nearly straight; lower margin of preoperculum serrated; lateral line ending before end of dorsal, the posterior lateral line tube obsolete; dorsal and anal spines compressed, moderately strong, ventral with a long axillary scale.

Color in formalin, snout slightly dotted grey, back with dark irregular lines and semicircles; in fresh condition, spinous dorsal with a bright orange blotch, inferiorly edged with black.

Leiognathus leuciscus (Günther, 1860)

Fig. 10 a, b, Table 1.

Equula leuciscus Günther, 1860: 503.

Leiognathus leuciscus, Weber and de Beaufort, 1931: 327–328.

Materials: 12 specimens: NTUM 05709(7), 60.5–75.5 mm SL, Aug., 1952, Penghu; NTUM

05710, 85.2 mm SL, July 15, 1978, Kaohsiung (Chungchou); NTUM 05711, 128.1 mm SL, June 28, 1980, Tungkang; NTUM 05712(3), 71.2–91.3 mm SL, March 16, 1984, Nan-fang-ao.

Descriptions: D. VIII, 16; A. III, 14; p. 17–19; gill rakers 16–18 (4–6+12); dorsal and ventral profiles more or less equally convex, upper profile of head rises to back with a little concavity; a minute spine above the front border of eye behind nostrils; mouth small, when protracted directs slightly downward, teeth minute in a single row; snout pointed, about equal to eye diameter, both profiles straight; the lower margin of preoperculum indistinctly serrated; lateral line extending beyond soft dorsal and becoming indistinct at the end of its course; the second dorsal spine very elongated, filiform, upper half of which flexible, extending beyond the middle of soft dorsal when it depressed; third dorsal spine also long, but only about half the length of the second dorsal spine; second anal spine filiform, its distal one-third flexible and reaching below the middle of soft anal when it depressed.

Color in formalin, tip of snout black, with a combination of semicircular, irregular and undulated lines from the dorsal base to below the lateral line; in fresh condition, lateral side with three yellow spots below the lateral line, one above the pectoral base, the other two under the dorsal spines and soft dorsal respectively.

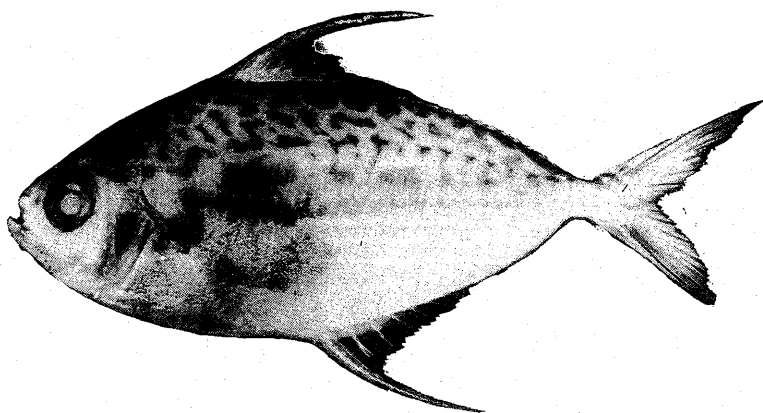


Fig. 10a. *Leiognathus leuciscus* (Günther), NTUM 05712, 91.3 mm SL.

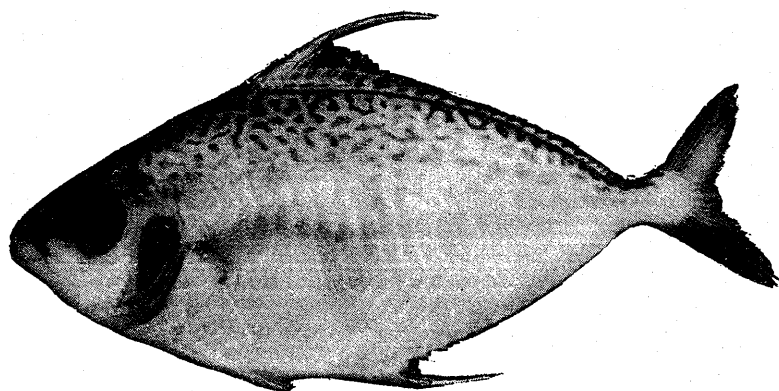


Fig. 10b. *Leioagnathus leuciscus* (Günther), NTUM 05711, 128.1 mm SL.

Remarks: The body depth of this species is higher in larger specimens, see Fig. 10a and Fig. 10b.

Leioagnathus berbis (Valenciennes, 1835)

Fig. 11, Table 1.

Equula berbis Valenciennes in Cuvier and Valenciennes, 1835: 85.

Leioagnathus berbis, Weber and de Beaufort, 1931: 336-337.

Materials: 11 specimens: NTUM 05695, 89.9 mm SL, April 23, 1978, Tachi; NTUM 05697, 84.7 mm SL, July 14, 1978, Tachi; NTUM 05698(2), 77.2 and 78.3 mm SL, March 16, 1979, Kaohsiung (Sinta harbor); NTUM 04104, 78.2 mm SL, March 27, 1980, Tungkang; NTUM 05699, 66.7 mm SL, Nov. 20, 1980, Tungkang; NTUM 05700, 76.0 mm SL, Oct. 26, 1981, Tachi; NTUM 05701(4), 67.2-74.0 mm SL, Feb. 26, 1984, Kaohsiung (Kou-tzu-liao).

Descriptions: D. VIII, 16; A. III, 14; P. 17-18; gill rakers 16-20 (5-6+11-14); body not much compressed, dorsal and ventral profiles nearly equally convex, upper profile of head rises to back with a little concavity; a single minute spine above the front border of eye behind nostrils; teeth minute in a single series, mouth small, when protracted directs slightly downward; snout pointed, somewhat shorter than eye diameter, both profiles straight; lower margin of preoperculum finely serrated; lateral line ending near or before end of dorsal, the posterior lateral line tube getting obsolete; dorsal and anal spines weak.

Color in formalin, snout dotted black, back with a few irregular spots under the dorsal and zig-zag lines arranged serially along the lateral line, dorsal and anal spines dotted grey.

Remarks: The head profile of *L. berbis* resembles that of *L. leuciscus* but the former

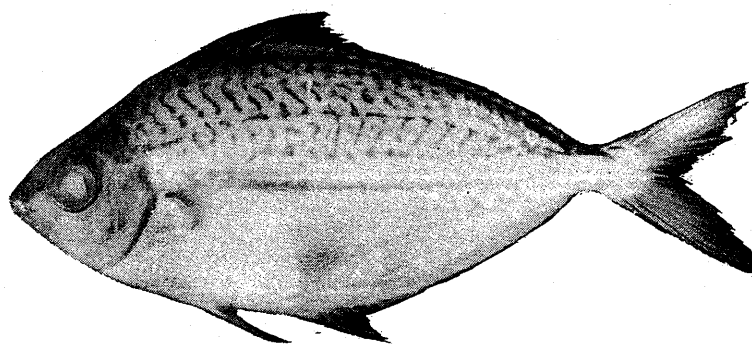


Fig. 11. *Leioagnathus berbis* (Valenciennes), NTUM 05701, 74.0 mm SL.

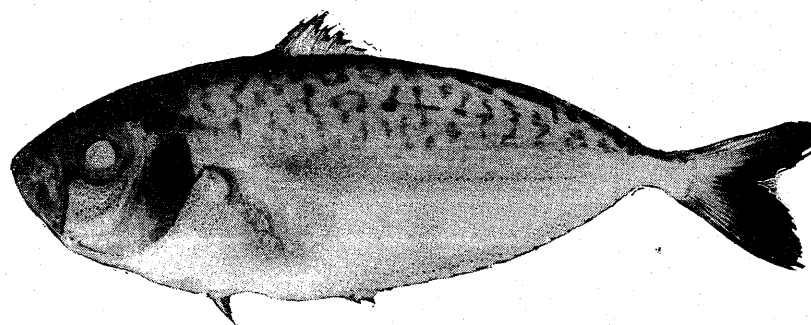


Fig. 12. *Leiognathus lineolatus* (Valenciennes), NTUM 05733, 82.8 mm SL.

can be distinguished by second dorsal spine not elongate and having regular undulated lines arranged serially along the lateral line.

Leiognathus lineolatus (Valenciennes, 1835)

Fig. 12, Table 1.)

Equula lineolata Valenciennes in Cuvier and Valenciennes, 1835: 86-87.

Leiognathus lineolatus, Weber and de Beaufort, 1931: 337-338.

Materials: 21 specimens: NTUM 05727, 54.8 mm SL, Jan. 24, 1979, Tachi; NTUM 04124, 86.2 mm SL, March 27, 1980, Tungkan; NTUM 05729(4), 49.2-71.6 mm SL, Oct. 31, 1982, Tungkan; NTUM 05730, 78.2 mm SL, Nov. 14, 1982, Tachi; NTUM 05731(2), 49.3 and 78.6 mm SL, Nov. 14, 1982, Tungkan; NTUM 05732(2), 71.2 and 75.9 mm SL, July 29, 1983, Tachi; NTUM 05733(9), 66.1-92.4 mm SL, Oct. 30, 1983, Tungkan; NTUM 05734, 88.0 mm SL, Jan. 10, 1984, Tachi.

Descriptions: D. VIII, 16; A. III, 14; P. 17-18; gill rakers 20-22 (4-4 + 15-17); body elongate, compressed, dorsal and ventral profiles more or less equally convex, upper profile of head rises to back without a concavity; a minute spine above the front border of eye behind nostrils; teeth minute, numerous mouth small, when protracted directs forward; snout pointed, both its profiles straight; lower margin of preoperculum finely serrated; the posterior lateral line tube getting obsolete; dorsal and anal spines weak, ventrals with axillary-scale like process.

Color in formalin, snout dotted black,

back with irregular lines, dots and semicircles, the ventral half of body spread with fine black dots.

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臺灣產鰻科魚類之研究

沈 世 傑 林 文 文

本文係報告臺灣近海產鰻科魚類之研究，該科共為12種，小牙鰻 *Gazza minuta*，牙鰻 *G. achlamys*，仰口鰻 *Secutor ruconius*，長吻仰口鰻 *S. insidiator*，等鰻 *Leiognathus equulus*，鈍鰻 *L. splendens*，短吻鰻 *L. brevirostris*，頸斑鰻 *L. nuchalis*，帶鰻 *L. bindus*，矛鰻 *L. leuciscus*，大眼鰻 *L. berbis*，線紋鰻 *L. lineolatus*。分屬於三屬，牙鰻 *Gazza*，仰口鰻 *Secutor* 及鰻 *Leiognathus*。其中有三種，牙鰻 *Gazza achlamys*，長吻仰口鰻 *Secutor insidiator* 及頸斑鰻 *Leiognathus nuchalis* 為新記錄。本文除提供種、屬之檢索外，並每種附圖以及扼要之描述。

